

REMARKS

Applicants appreciate the detailed examination evidenced by the Office Action mailed November 4, 2008 ("Office Action"). Applicants have amended independent Claim 1 to incorporate recitations from Claim 3, which has been canceled. Applicants submit that amended independent Claim 1 is patentable over the combination of U.S. Patent Application Publication No. 2003/0210056 to Arai et al. ("Arai") and U.S. Patent Application Publication No. 2002/0060555 to Finger ("Finger") cited in the rejection of Claim 3. Applicants also traverse the rejection of independent Claim 10 based on Arai and Finger, and the rejection of independent Claim 13 based on the cited combination of Finger, U.S. Patent No. 4,331,699 to Suzuki ("Suzuki") and U.S. Patent Application Publication No. 2004/0101747 to Bushong et al. ("Bushong"). Reasons supporting patentability of the claims are discussed in detail below.

Amended independent Claim 1 is patentable

Claim 1 has been amended to incorporate subject matter from Claim 3, and now recites:

A method for determining polarisation of an electrode of a VRLA battery, the method including the steps of: allowing the battery to discharge for a selected period of time, monitoring the battery voltage during the selected period, detecting a first change in the battery voltage and a second change in the battery voltage, and of a associating the first change with polarisation of a negative electrode and the second change with polarisation of a positive electrode.

The Office Action cites a combination of Arai and Finger in rejecting Claim 3 under 35 U.S.C. § 103(a) in rejecting Claim 3. Office Action, p. 3. Applicants submit that this rejection is erroneous.

Arai describes a technique for monitoring battery status and detecting a saturation polarization by monitoring a discharge current and terminal voltage detected during a period of battery discharge. The polarization referred to in Arai is a negative polarization during high rate discharges where the terminal voltage is below the open circuit rest voltage. While Arai discusses charge polarization above the open circuit rest voltage (see paragraph 22; Claim 9), Arai does not disclose or suggest decomposition of polarization into polarization of positive and/or negative electrodes, *i.e.*, Arai does not disclose or suggest "associating the

first change with polarisation of a negative electrode and the second change with polarisation of a positive electrode." This appears to be conceded by the Office Action on page 3, where the Office Action further concedes that Arai does not disclose "detecting a first change in battery voltage and a subsequent second change in battery voltage."

Finger does not supply the missing teachings. Finger describes a technique for restoring charge to a battery based on calculating the degradation of the battery in operation and restoring the battery by providing a sufficient charge. *See* Finger, Abstract. The technique described in Finger involves applying a charge restoration using, for example, an auxiliary commutated power source (see, *e.g.*, Fig. 7; paragraph [0045]), which will drive the negative electrode to a large polarization. Finger does not disclose or suggest, however, determining the negative electrode polarization or lack thereof during the steady state float charge. In addition, Finger does not disclose or suggest determining a distribution of the total polarization of a VRLA battery between positive and negative electrodes. The model shown in Figure 2 of Finger simply assumes that self-discharge of the negative electrode occurs and that restoration is required, which may not be the case in a well-designed or well-manufactured cell.

The Office Action cites paragraphs [0015] and [0032] of Finger as allegedly teaching "detecting a first change in battery voltage and a subsequent second change in battery voltage, and associating the first change with polarisation of a negative electrode and the second change with polarisation of a positive electrode." Office Action, pp. 3 and 4. Paragraph [0015] appears to be devoid of any description of detecting first and second changes in battery voltage and association of these changes with polarization of negative and positive electrodes. Rather, this paragraph describes determination of a rate of degradation of a battery in terms of a decrease in capacity, providing charge to restore a degree of the battery capacity, and determining how the battery responded to the restoration of charge. The cited paragraph [0032] is equally lacking, referring only to circumventing a "delicate balance of polarization" and using plate depolarization as a self-discharge mechanism, and further mentioning that a response to charge restoration may be used to determine health of a battery. Thus, paragraphs [0015] and [0032] of Finger include no description corresponding to "detecting a first change in the battery voltage and a second change in the battery voltage, and associating the first change with polarisation of a negative electrode and the second change

with polarisation of a positive electrode." As Arai also does not provide such teachings, the cited combination of Arai and Finger does not disclose or suggest the recitations of amended independent Claim 1. For at least these reasons, amended independent Claim 1 is patentable.

Independent Claim 10 is patentable

Independent Claim 10 recites:

A method of providing a float charge to a VRLA battery, the method including the steps of: allowing the battery to discharge for a selected period of time, monitoring the battery voltage during the selected period, and applying a float charge to the battery dependent on the change in battery voltage over the selected period.

Claim 10 stands rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Arai in view of Finger. Office Action, p. 3. The Office Action concedes that Arai does not teach "applying a float charge to the battery dependent on the change in battery voltage over the selected period," but asserts that Figure 12 of Finger provides such teachings. Office Action, pp. 4 and 5. Applicants respectfully submit that this reasoning is erroneous.

The only reference to "float charge" in the description of Figure 12 in paragraph [0051] is "[w]hen the commutated power source is active, the voltage across the cell or module receiving charge restoration rises above its normal float charge level." There is nothing that indicates float charging is based on a change in battery voltage during a selected discharge period. Accordingly, Finger does not disclose or suggest "applying a float charge to the battery dependent on the change in battery voltage over the selected period," recitations which the Office Action acknowledges are also not taught by Arai. Applicant further notes that the Office Action articulates no rationale for combining Arai and Finger to produce the recitations of independent Claim 10. Accordingly, the rejection is erroneous should be withdrawn. The cited combination of Arai and Finger simply does not disclose or suggest the recitations of Claim 10 and, for at least these reasons, Claim 10 is patentable.

Independent Claim 13 is patentable

Independent Claim 13 recites:

A method of providing a float charge to a VRLA cell, the method including the steps of: determining the peak Tafel equivalent resistance for the cell and applying a voltage to the cell electrodes dependent on the determined equivalent resistance

Independent Claim 13 stands rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over a combination of Finger in view of Suzuki and Bushong. Office Action, p. 5.

As discussed above, Finger describes restoring charge to a battery. Finger is devoid, however, of any discussion of determining a peak Tafel equivalent resistance for a cell. In fact, contrary to the assertions of the Office Action on page 5, the cited paragraphs [0015] and [0052] include no reference whatsoever to "resistance," let alone *Tafel equivalent resistance for a cell*. Accordingly, Finger appears to be irrelevant to the subject matter of Claim 13.

Bushong relates to detecting the presence of rechargeable batteries in a charger by detecting a *resistance of a band of ink* that surrounds cells and has a predetermined resistance. Respectfully, this has nothing to do with determining a peak *Tafel equivalent resistance of a cell*. Accordingly, Bushong is irrelevant to the subject matter of independent Claim 13, and has nothing to do with the subject matter in Finger.

Apparently mistakenly referring to Finger, the Office Action appears to cite Suzuki for "using Tafel slope to determine equivalent resistance." Office Action, p. 5. Suzuki relates to electroless plating, not VLRA cells, and describes determination of *Tafel slopes of anodic reaction in an electroless plating bath*, not *Tafel equivalent resistance of a VRLA cell*. Accordingly, Suzuki is also irrelevant to independent Claim 13, as well as to Finger and Bushong.

Accordingly, the cited combination of Finger, Bushong and Suzuki does not disclose or suggest the recitations of independent Claim 13, and there is no rationale for combining these references to produce the recitations of independent Claim 13. For at least these reasons, independent Claim 13 is patentable.

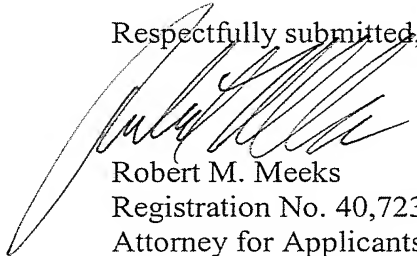
The dependent claims are patentable

Applicants submit that dependent Claims 2 and 4-12 are patentable at least by virtue of the patentability of the respective ones of independent Claims 1 and 10 from which they depend. Applicants further submit that several of these dependent claims are separately patentable, but defer further discussion of these claims in light of the clear errors in the rejections of independent Claims 1 (formerly Claim 3) and 10.

Conclusion

As all of the claims are now in condition for allowance, Applicants respectfully request allowance of the claims and passing of the application to issue in due course. Applicants encourage the Examiner to contact Applicants' undersigned representative at (919) 854-1400 to resolve any remaining formal issues.

Respectfully submitted,

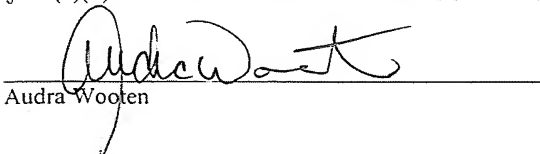


Robert M. Meeks
Registration No. 40,723
Attorney for Applicants

USPTO Customer No. 20792
Myers Bigel Sibley & Sajovec
Post Office Box 37428
Raleigh, North Carolina 27627
Telephone: 919/854-1400
Facsimile: 919/854-1401

CERTIFICATION OF TRANSMISSION

I hereby certify that this correspondence is being transmitted via the Office electronic filing system in accordance with § 1.6(a)(4) to the U.S. Patent and Trademark Office on February 4, 2009.



Audra Wooten